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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,609	09/30/2003	Haruaki Watanabe	ASA-901-02	2559

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EXAMINER	
BLACK, LINH	

ART UNIT	PAPER NUMBER
2159	

MAIL DATE	DELIVERY MODE
08/19/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/673,609	WATANABE ET AL.	
	Examiner	Art Unit	
	LINH BLACK	2159	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11,12,14-17,19-22 and 24-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-12, 14-17, 19-22, 24-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This communication is responsive to the Applicants' Amendment dated 9/17/08. Claims 11-12, 14-17, 19-22, 24-30 are pending in the application. Claims 11, 16, 21, 24, and 27 are independent claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11-12, 14-17, 19-22, 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Milligan et al. (US 5210866) in view of Ludlam et al. (5459857) and further in view of Nolan (US 6252514 B1).

As per claims 11, 16, Milligan et al. teach data recovering in case of processing failure – col. 3, line 13 to col. 4, line 46.

a host computer and a storage system storing data accessed by said host computer – col. 5, lines 30-34; fig. 1 (host processors 11, 12, connect to multi-path storage directories 10-0, 110-1 of the data storage subsystem 100)

wherein said storage system includes a first physical storage area in one or more disks in said storage system and a controller for accessing the one or more disks in said storage system – fig. 1, items 100-125 (data storage subsystem 100 includes a disk drive subset 122-125 and control unit: 101 with cluster control 111 and 112 for accessing to disk drive manager and disk drive subsets); col. 3, lines 13-49.

wherein said first physical storage area corresponds to a first logical volume accessed by said host computer; wherein said host computer stores data in said first physical storage area, and stores a backup copy of the data at a certain point in time – col. 1, line 61 to col. 2, line 32 (The parallel disk drive array switch-ably interconnects a plurality of disk drives into redundancy groups that each contain n+m data and redundancy disk drives. Data records received from the associated host processors are written on logical tracks in a redundancy group that contains an empty logical cylinder... By maintaining the memory map, the data storage subsystem can easily identify which logical cylinders contained in the disk drive array contain modified data records that require backup...the backup medium can be a tape drive); fig. 1; col. 11, line 65 to col. 12, line 2 (The redundancy group is also called a logical volume or logical device. Within each logical device there are a plurality of logical tracks, each of which is the set of all physical tracks in the redundancy group which have the same physical track address); col. 21, line 11 col. 22, line 32; col. 25, lines 15-55 (backup copy/snapshot copy – at certain point in time - used for disk backup purposes or write these modified virtual tracks to a tape drive...)

wherein after said certain point in time, upon occurrence of a failure in a sequence of processing executed by said host computer, said host computer selects an unused second logical volume in said storage system, said second logical volume corresponding to a second physical storage area in said one or more disk, and reads the backup copy of the data made at the certain point in time and write the backup copy of the data to said second logical volume – col. 1, line 65 to col. 2, line 30; col. 5, line 30 to col. 6, line 3 (a plurality of host processors 11-12 interconnected via the respective plurality of data channels 21, 22-31, 32, respectively to a data storage subsystem 100 that provides the backend data storage capacity for the host processors 11.12...the multi-path storage director 110-0 provides a hardware interface to the associated data channels ex-21 from any host processor ex-11 to interconnect to a selected cluster control 111 within control unit 101...Control unit 101 includes the creation and regulation of data redundancy groups, reconstruction of data for a failed disk drive, switching a spare disk drive in place of a failed disk drive, data redundancy generation, logical device space management, and virtual to logical device mapping); col. 6, lines 43-61 (...providing a pool R spare disk drives that are switchably interconectable in place of a failed disk drive...the redundancy information stored in the redundancy segments can be used by control software in control unit 101 to reconstruct the data lost when one or more of the plurality of disk drives in the redundancy group fails); col. 11, line 65 to col. 12, line 25 (the redundancy group is also called a logical volume/device ...). Thus, host processors are interconnected to the data storage subsystem in which

the 2nd redundancy group or logical volume would be connected for use in case of the first logical volume failure and reconstructing of the data lost.

exchanging positional information of the first logical volume with that of the second volume and said controller accesses said second physical storage area when said controller receives an access request to said first logical volume from said host computer – col. 3, last par. (once a failed disk drive in a redundancy group is identified, a backup disk drive from the shared pool of spare disk drives is automatically switched in place of the failed disk drive. Control circuitry reconstructs the data stored on each physical track of the failed disk drive…the reconstructed data is then written onto the substitute disk drive); col. 5, line 63 to col. 6, line 3 (swap/switch a backup disk drive to a the failed disk drive is automatically done in which it is done by switching/exchanging the positional/address information of each other); the command and status circuit 301 collect status from the various subsystem 302, report the status to the control unit 101 and provide diagnostics for disk drive manager 102-1 – col. 9, line 23 to col. 10, line 34; identification of the failed physical disk drive provides information on the bit position of the errors in the logical track and the redundancy data provides information to correct the errors – col. 3, last paragraph (thus, as a disk drive error is reported to the control unit 101, an access request to said failed disk would be redirected/mapped to the newly replaced drive).

However, Milligan et al. discloses ...the control unit marks the virtual track instance that is stored in the redundancy group as invalid in order to assure that the logical location at which this virtual track instance is stored is not accessed in response to another host processor 12 attempting to read or write the same virtual track – col. 17, line 39 to col. 18, line 25. Milligan seems not disclose said storage system issues a device busy request to said host computer when said storage system receives an access request to said first logical volume... Ludlam et al. discloses Fault tolerant disk array data storage subsystem – the title; reconstruction of data for a failed disk drive, switching a spare disk drive in place of a failed disk drive – col. 5, line 64 to col. 6, line 4; the channel, such as 123-0 receives a start I/O instruction from host processor 101 to start a channel program...if the selected virtual disk drive device indicates busy in the initial status byte, a signal is sent to the host processor indicating this and the command is issued again by the host processor 101 a short time later- col. 9, lines 59 to col. 10, line 14. Therefore, Ludlam does disclose the switching to a second/spare disk drive if the first one failed. Ludlam discloses the value can be set in the "initial status byte" to indicate a disk drive device is busy. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Ludlam et al.'s teaching in order to allow the communication of busy signals between computer devices thus helps speed up the data communication processes.

Milligan and Ludlam seem not disclose host computer issues a swap request to said storage system...Nolan discloses hot-swap assembly for computers - the title; in response to the operator signal, the host system performs power management and

communication management routines to prepare the system for a hot swap operation. Until the power and communication management routines have completed, the lock associated with the component to be removed is set in a position to prevent removal – col. 3, lines 16-29; The GUI 160 provides an interface for operator of the device. The interface is monitored by control processes in the host system for managing host swap operations - col. 4, last paragraph; Since the swap operations is controlled and the communication management routine for the swap operation is performed by the host, the host therefore, would communicate the swap request to the storage system. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Ludlam et al.'s and Nolan's teachings in order to allow the communication of swapping operation between computer devices/hosts with the associated storage system be performed efficiently.

As per claims 12, 17, Milligan et al. teach:

wherein before receiving said swap request, said controller relates an ID of said first logical volume to an ID of said first physical storage area and accesses said first physical storage area according to an access request including said ID of said first logical volume received from said host computer; wherein after receiving said swap request, said controller relates an ID of said first logical volume to an ID of said second physical storage area, and accesses said second physical storage area according to an access request including said ID of said first logical volume received from said host computer – col. 3, line 50 to col. 4, line 46; col. 7, line 30 to col. 8, line 39.

As per claims 14, 19, Milligan et al. teach:

wherein said storage system includes plural first physical storage areas, each of which corresponds to a first logical storage area in said first logical volume, and plural second physical storage areas, each of which corresponds to one of said plural first physical storage areas – fig. 6, item 605; col. 3, line 12 to col. 4, line 46; col. 11, line 47 to col. 12, line 46.

wherein said controller stores the backup copy of the data in said plural second physical storage areas, said backup copy of the data stored in the second physical storage area being the data stored in the first physical storage area corresponding to said second physical storage area at the certain point in time – col. 5, line 30 to col. 6, line 3; col. 21, line 11 to col. 22, line 32.

according to said swap request, said controller relates one of said plural second physical storage areas to a first logical storage area which corresponds to a first physical storage area corresponding to said one of said plural second physical storage areas, so that said controller accesses said one of said plural second physical storage areas when said controller receives an access request to said first logical storage area - col. 7, lines 29-66; col. 3, line 50 to col. 4, line 46.

As per claims 15, 20, Milligan et al. teach:

wherein before receiving said swap request, said controller relates an ID of said first logical volume to Ids of first logical storage areas and IDS of said plural first physical storage areas and accesses one of said plural first
physical storage areas according to an access request including said ID of said first logical volume and an ID of a first logical storage area - col. 3, lines 13-49.
wherein after receiving said swap request, said controller relates said ID of said first logical volume to said IDS of said first logical storage areas, an ID of at least one of said plural first physical storage areas, and an ID of said one of said plural second physical storage areas, and accesses said one of said plural second physical storage areas according to an access request including said ID of said first logical volume and an ID of a first logical storage area corresponding to said ID of said one of said plural second physical storage areas – col. 3, line 50 to col. 4, line 46; col. 7, line 30 to col. 8, line 39.

As per claims 21, 24, Milligan et al. teach:
at least one disk; a first physical storage area in said at least one disk, said first physical storage area being included in a first logical volume accessed by said host computer, a second physical storage area included in a second logical volume in said at least one disk – col. 2, lines 55-58; col. 3, line 13 to col. 4, line 46; col. 11, line 65 to col. 12, line 2 (The redundancy group is also called a logical volume or logical device. Within each logical device there are a plurality of logical tracks (these tracks should be continuous), each of which is the set of all physical tracks in the redundancy group which have the same physical track address); col. 21, lines 11-65.

a controller coupled to said at least one disk; wherein a backup data is stored, said backup copy of data being a copy of data stored in said first physical storage area at a certain point in time; wherein said controller accesses said first physical storage area according to an access request to said first logical volume received from said host computer - col. 1, line 61 to col. 2, line 32; col. 3, lines 13 to col. 4, line 47; col. 21, line 11 col. 22, line 32.

wherein when recovery of the data in the first loqical volume to the certain point in time becomes necessary, said host computer selects the second logical volume in said storage system, and reads the backup copy of the data made at certain point in time from the tape to said second logical volume - col. 1, line 65 to col. 2, line 9; col. 3, lines 57-60; col. 5, line 63 to col. 5, line 3; col. 6, lines 43-61.

exchanging positional information of the first logical volume with that of the second volume and said controller accesses said second physical storage area when said controller receives an access request to said first logical volume from said host computer – col. 3, last par. (once a failed disk drive in a redundancy group is identified, a backup disk drive from the shared pool of spare disk drives is automatically switched in place of the failed disk drive. Control circuitry reconstructs the data stored on each physical track of the failed disk drive...the reconstructed data is then written onto the substitute disk drive); col. 5, line 63 to col. 6, line 3 (swap/switch a backup disk drive to

a the failed disk drive is automatically done in which it is done by switching/exchanging the positional/address information of each other); the command and status circuit 301 collect status from the various subsystem 302, report the status to the control unit 101 and provide diagnostics for disk drive manager 102-1 – col. 9, line 23 to col. 10, line 34; identification of the failed physical disk drive provides information on the bit position of the errors in the logical track and the redundancy data provides information to correct the errors – col. 3, last paragraph (thus, as a disk drive error is reported to the control unit 101, an access request to said failed disk would be redirected/mapped to the newly replaced drive).

However, Milligan et al. discloses ...the control unit marks the virtual track instance that is stored in the redundancy group as invalid in order to assure that the logical location at which this virtual track instance is stored is not accessed in response to another host processor 12 attempting to read or write the same virtual track – col. 17, line 39 to col. 18, line 25. Milligan seems not disclose said storage system issues a device busy request to said host computer when said storage system receives an access request to said first logical volume... Ludlam et al. discloses Fault tolerant disk array data storage subsystem – the title; reconstruction of data for a failed disk drive, switching a spare disk drive in place of a failed disk drive – col. 5, line 64 to col. 6, line 4; the channel, such as 123-0 receives a start I/O instruction from host processor 101 to start a channel program...if the selected virtual disk drive device indicates busy in the initial status byte, a signal is sent to the host processor indicating this and the command

is issued again by the host processor 101 a short time later- col. 9, lines 59 to col. 10, line 14. Therefore, Ludlam does disclose the switching to a second/spare disk drive if the first one failed. Ludlam discloses the value can be set in the "initial status byte" to indicate a disk drive device is busy. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Ludlam et al.'s teaching in order to allow the communication of busy signals between computer devices thus helps speed up the data communication processes.

Milligan and Ludlam seem not disclose host computer issues a swap request to said storage system...Nolan discloses hot-swap assembly for computers - the title; in response to the operator signal, the host system performs power management and communication management routines to prepare the system for a hot swap operation. Until the power and communication management routines have completed, the lock associated with the component to be removed is set in a position to prevent removal – col. 3, lines 16-29; The GUI 160 provides an interface for operator of the device. The interface is monitored by control processes in the host system for managing host swap operations - col. 4, last paragraph; Since the swap operations is controlled and the communication management routine for the swap operation is performed by the host, the host therefore, would communicate the swap request to the storage system. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Milligan et al.'s teaching with Ludlam et al.'s and Nolan's teachings in order to allow the communication of swapping operation between computer devices/hosts with the associated storage system be performed efficiently.

As per claims 22, 25, Milligan et al. teach:
wherein said controller relates an ID of said first logical volume to an ID of said second physical storage area according to said swap request, so that said controller accesses said second physical storage area when said controller receives an access request including said ID of said first logical volume after receiving said swap request - col. 3, lines 13-49.

As per claim 26, Milligan et al. teach: wherein said backup data is stored from a tape medium to said second physical storage area – fig. 1; col. 8, line 40 to col. 9, line 20.

Claims 27-30 claim the same subject matter as of previous claims and are rejected based on the same rationale.

Response to Arguments

Applicant's arguments filed 5/11/09 have been fully considered but they are not persuasive. Regarding the Applicant's argument on page 20 that Milligan fails to disclose a failure of host computer, this claim's limitation seems not disclose or clearly disclose in the claims' limitations.

Applicant has amended the independent claims to add limitations "wherein said host computer issues a swap request…" and "wherein said storage system issues a

busy request to said host computer..." Therefore, a new combination cited preference are provided above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LINH BLACK whose telephone number is 571-272-4106. The examiner can normally be reached on Mon.-Thurs..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Trujillo can be reached on 571-272-3677. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wilson Lee/
Primary Examiner, Art Unit 2163

8-16-09

LINH BLACK
Examiner
Art Unit 2159